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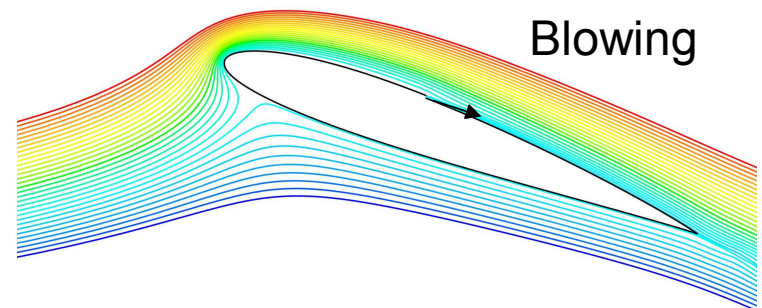
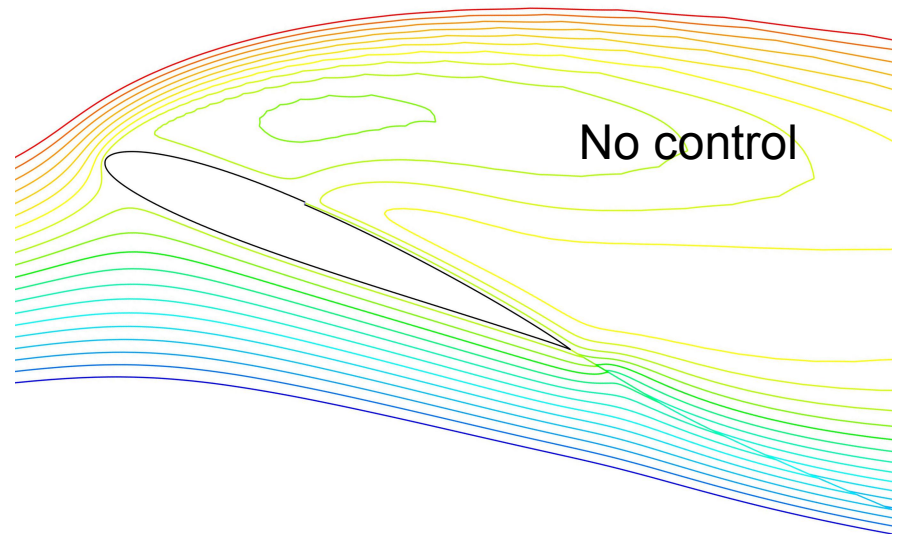


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What is Flow Control?

Active



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Manufacturing Process Flows

The cost effectiveness and capabilities of many manufacturing processes are directly related to the ability to control flows.

More effectively controlling flows in manufacturing leads to:

- Higher volume/throughput
- Improved accuracy
- Improved speed
- Improved product quality/consistency

The manufacturing community has many technologies which have not taken advantage of effective flow control methodologies.



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CFM Technologies Under Development

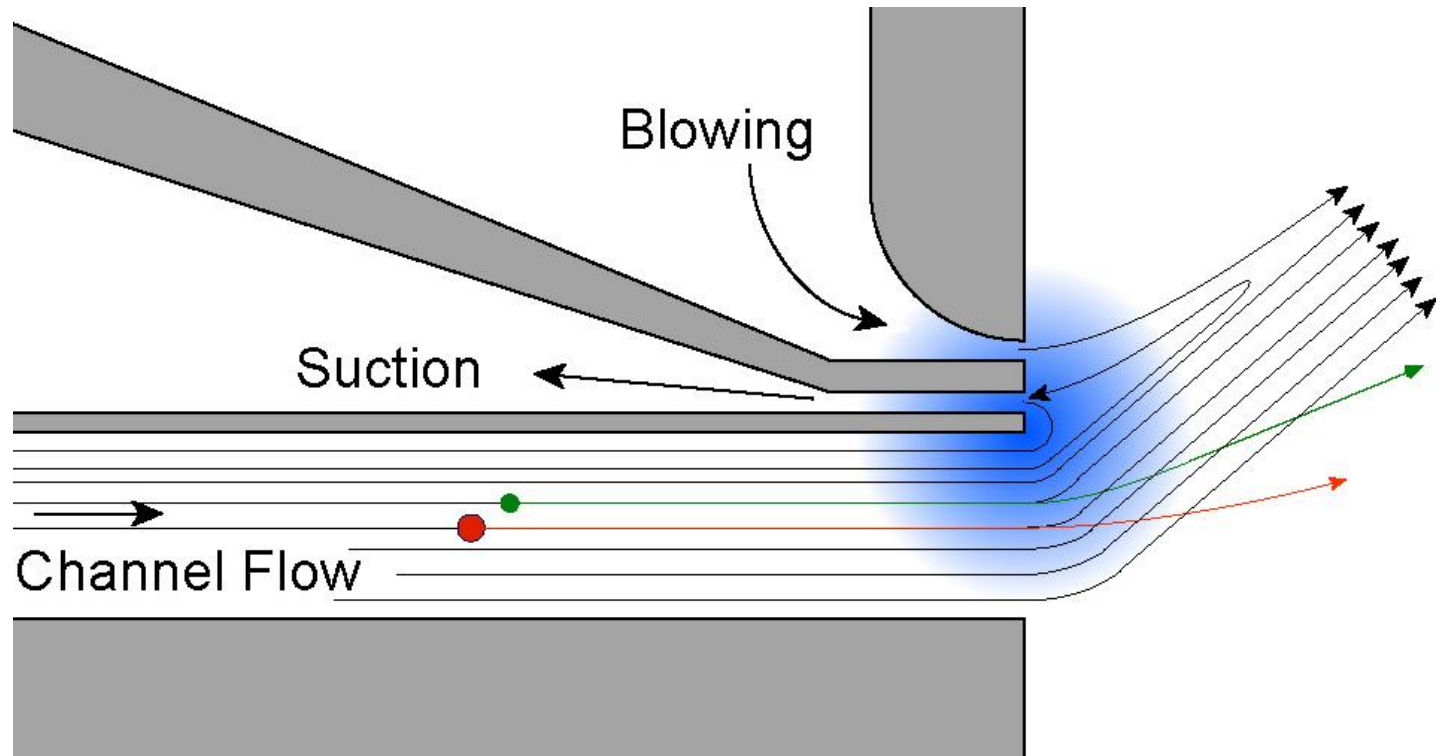
- Particle Sorting and Concentrating
- Particle Flushing in Electrical Discharge Machining
- Mass Flow Control for Metal Deposition Technologies



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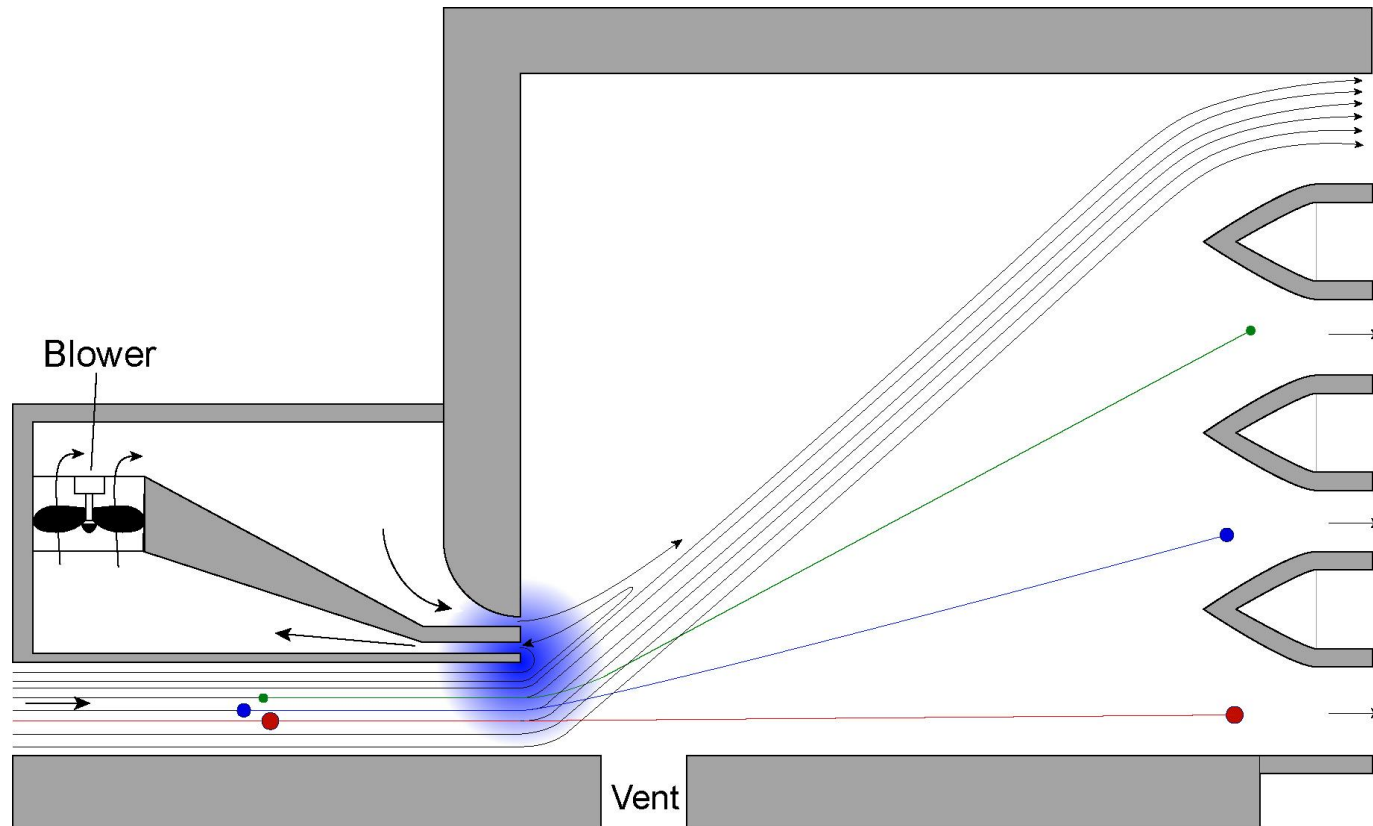
Aerodynamic Vectoring Particle Separation



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AVPS Product

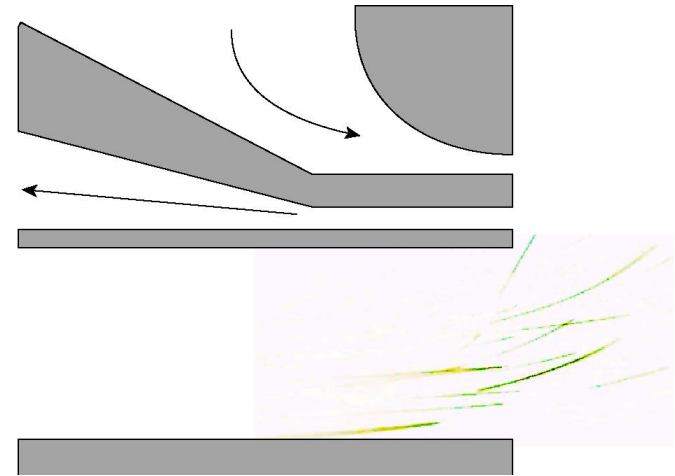
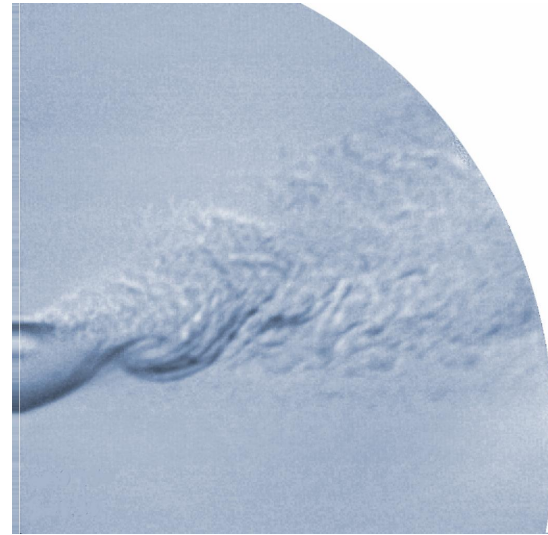
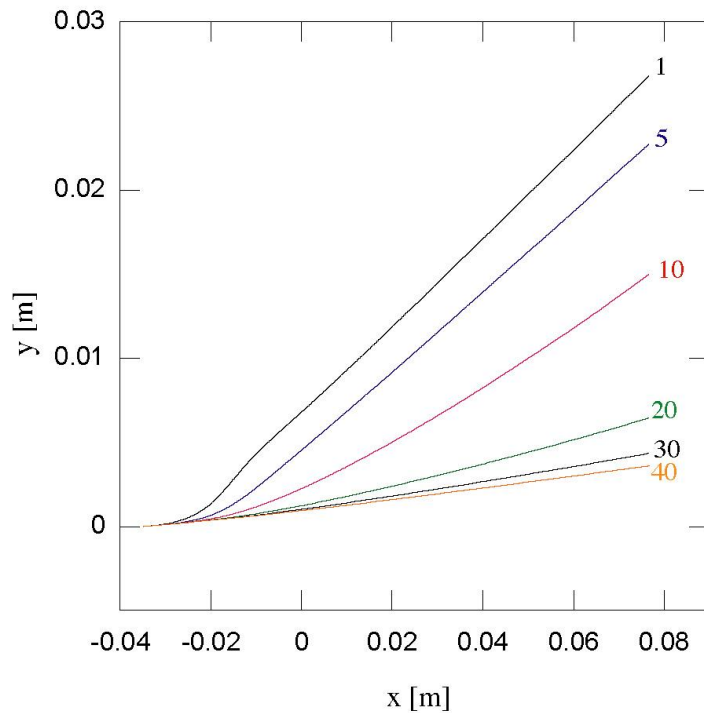


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AVPS Preliminary Results

Experimental Results

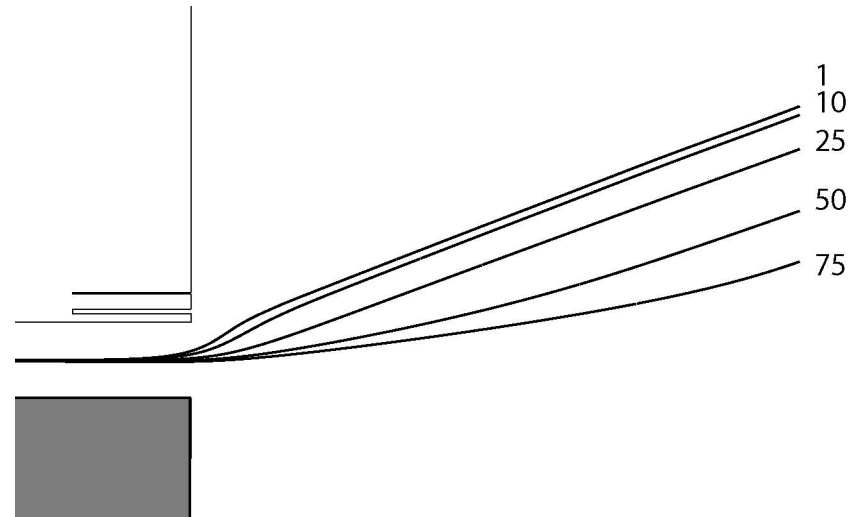
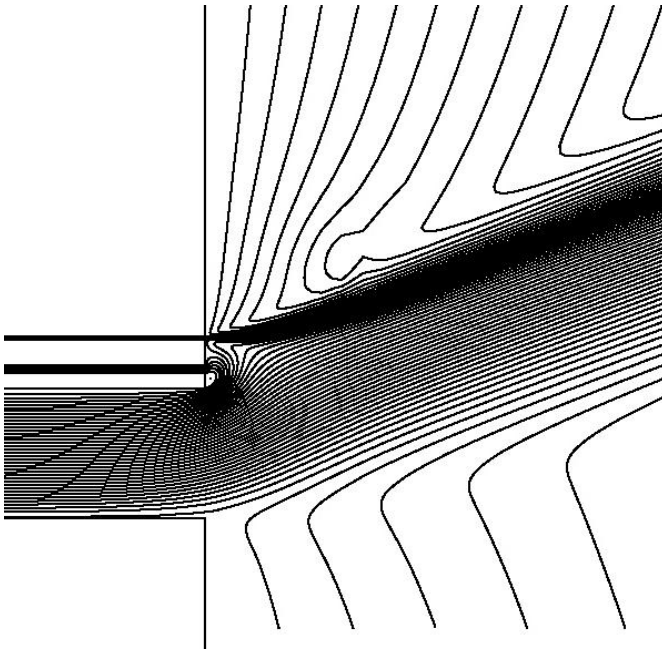


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AVPS Preliminary Results

Numerical Results



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Applications

The ability to sort particles by size continuously has application in a wide variety of fields including:

- ADHESIVES
- AEROSPACE INDUSTRY
- JET ENGINES
- METAL POWDERS
- AGROCHEMICALS
- ASPHALTS
- LIFESCIENCE AND BIO TECHNOLOGY
- CEMENT INDUSTRY
- CERAMICS INDUSTRY
- COSMETICS AND PERSONAL CARE
- ENVIRONMENTAL
- FOOD AND DRINK INDUSTRY
- MINING AND MINERALS
- NANO PARTICLES
- PAINTS, INKS AND SURFACE COATINGS
- PAPER AND PULP
- PHARMACEUTICALS
- POLYMERS
- PROTEINS



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AVPS Advantages

- The ability to divide the particle range into multiple bins without device staging.
- Non-contact separation can be achieved, reducing possible damage or contamination of particles.
- Low pressure drop through the device, since no obstacle is placed in the flow path and no staging is required.
- The ability to operate over a range of flow rates without modifying the geometry.
- At least two particle forces are important in AVPS--Drag and Pressure. The dependence on an additional force may result in more control over the particle path and provide the ability to sort a larger range of particle sizes.



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AVPS Path to market

- Develop AVPS Particle-Sorting Prototype
 - File for Additional Patent Protection Based on Prototype Development Lessons Learned
 - Demonstrate AVPS Technology Advantages
- Develop Commercialization Strategy
 - Likely a Utah Company Start-up or Strategic Partnership
- Introduce Particle Sorting to the Marketplace
- Continue Development on AVPS Pathogen Concentrators and other AVPS technologies
 - Develop commercialization strategies as necessary



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Recent NSF STTR Award

Our proposal to NSF for manufacturing related technology development was reviewed by a panel of manufacturing experts.

The proposal was one of 100 selected from a pool of over 1000, and received the maximum possible score.

Some reviewer remarks:

“The technique of aerodynamic jet vectoring has a considerable commercial potential as particle sorting is of great use in many industries, from drug delivery to flame retardants.”

“I really liked the simplicity of what was proposed, its broad application, and potential miniaturization.”

“The applications of the technology are broad and significant, perhaps even more so than the PI's appreciate.”

“The proposal makes clear that the technology has significant commercialization promise, and I tend to agree. What catches my attention here is the simplicity and the potential for both small-scale and large-scale versions of the device.”



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Future Technologies

AVPS is the first technology we plan to commercialize. We have made other disclosures and anticipate even more in the future. As AVPS moves to market, we will begin work on other ideas already in the pipeline.

For example:

- EDM dielectric fluid delivery and mixing
- Control of two phase flow rate in powder processes
- Control of direction and width of sprays



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Possible CFM Commercialization Strategies

- Field of Use Licenses
 - AVPS license for production of Homeland Security pathogen concentration devices
- Manufacture of End-Use Products
 - Utah Start-up Making Powder Metal Sorting Systems
- Joint Ventures
 - Partner with EDM supplier to market advanced flushing techniques



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Intellectual Property

The CFM Team has already developed a considerable amount of IP including:

Patents under prosecution directly relevant to CFM 2

Invention disclosures directly relevant to CFM 4

The CFM team also has 5 patents issued



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Resources

Experimental Fluid Dynamics Laboratory

High Performance Computing Center at USU

**Advanced Manufacturing & Materials
Laboratory**



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Conclusion

- An opportunity currently exists to revolutionize manufacturing processes using established flow control methodologies.
- The CFM team is uniquely positioned and qualified to capitalize on this opportunity, having
 - Expertise
 - Flow control
 - Advanced manufacturing processes
 - Experimental and numerical fluid dynamics
 - Resources
 - Experimental Fluid Dynamics Laboratory
 - High Performance Computing Center
 - Advanced Manufacturing & Materials Laboratory
- CFM has a proven track record for successful invention development, and funding of these ideas from federal and other sources.



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